requires acute bioassays using 100% effluent. Compliance with the acute toxicity effluent limitation assures the effluent is not acutely toxic.

The discharge will not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws, because this Order does not allow mixing zones for compliance with aquatic toxicity criteria. The Discharger must meet stringent end-of-pipe effluent limitations for constituents that demonstrated reasonable potential to exceed aquatic toxicity criteria (i.e. ammonia, aluminum, cyanide, total residual chlorine).

The discharge will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum, produce objectionable color, odor, taste, or turbidity, cause objectionable bottom deposits, or cause nuisance, because this Order requires end-of-pipe effluent limitations (e.g. for biochemical oxygen demand and total suspended solids) and discharge prohibitions to prevent these conditions from occurring.

As suggested by the SIP, in determining the extent of or whether to allow a mixing zone and dilution credit, the Regional Water Board has considered the presence of pollutants in the discharge that are carcinogenic, mutagenic, teratogenic, persistent, bioaccumulative, or attractive to aquatic organisms, and concluded that the allowance of the mixing zone and dilution credit is adequately protective of the beneficial uses of the receiving water.

The mixing zone therefore complies with the SIP. The mixing zone also complies with the Basin Plan, which requires that the mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Regional Water Board has considered the procedures and guidelines in the EPA's Water Quality Standards Handbook, 2d Edition (updated July 2007), Section 5.1, and Section 2.2.2 of the Technical Support Document for Water Quality-based Toxics Control (TSD). The SIP incorporates the same guidelines.

3. Determining the Need for WQBELs

a. CWA section 301 (b)(1) requires NPDES permits to include effluent limitations that achieve technology-based standards and any more stringent limitations necessary to meet water quality standards. Water quality standards include Regional Water Board Basin Plan beneficial uses and narrative and numeric water quality objectives, State Water Board-adopted standards, and federal standards, including the CTR and NTR. The Basin Plan includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, and tastes and odors. The narrative toxicity objective states: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at III-8.00.) With regards to the narrative chemical constituents objective, the Basin Plan states that waters shall not contain chemical

constituents in concentrations that adversely affect beneficial uses. At minimum, "*...water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)*" in Title 22 of CCR. The narrative tastes and odors objective states: "*Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.*"

b. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. Based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs, the Regional Water Board finds that the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for aluminum, ammonia, bis (2-ethylhexyl) phthalate, chlorine (total residual), chlorodibromomethane, cyanide, dichlorobromomethane, electrical conductivity, manganese, molybdenum, and nitrate plus nitrite. Water quality-based effluent limitations (WQBELs) for these constituents are included in this Order. A summary of the reasonable potential analysis (RPA) is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

c. The Regional Water Board conducted the RPA in accordance with Section 1.3 of the SIP. Although the SIP applies directly to the control of CTR priority pollutants, the State Water Board has held that the Regional Water Board may use the SIP as guidance for water quality-based toxics control.[2] The SIP states in the introduction "*The goal of this Policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency.*" Therefore, in this Order the RPA procedures from the SIP were used to evaluate reasonable potential for both CTR and non-CTR constituents.

d. WQBELs were calculated in accordance with section 1.4 of the SIP, as described in Section IV.C.4 of this Fact Sheet.

e. **Aluminum.** The Secondary MCL for aluminum for the protection of the MUN beneficial use is 200 µg/L. In addition, USEPA developed National Recommended Ambient Water Quality Criteria (NAWQC) for protection of freshwater aquatic life for aluminum, and the recommended four-day average (chronic) and one-hour average (acute) criteria are 87 µg/L and 750 µg/L, respectively. However, information contained in the footnotes to the NAWQC indicate that the development of the chronic criterion was based on specific receiving water conditions where there is low pH (below 6.5) and low hardness levels (below 50 mg/L as CaCO3). The San Joaquin River (SJR) has been measured to have hardness values—typically between 57 and 152 mg/L as

[2] See, Order WQO 2001-16 (Napa) and Order WQO 2004-0013 (Yuba City).

$CaCO_3$. Because the hardness values in the SJR are higher (which decreases the toxic effects to aquatic life) than the water hardness values in which the criterion was developed, USEPA advises that a water effects ratio (WER) might be appropriate to better reflect the actual toxicity of aluminum to aquatic organisms.

In May 2006, the Arid West Water Quality Research Project produced a research report, *Evaluation of the EPA Recalculation Procedure in the Arid West Technical Report*, to update NAWQC based on more recent data, and to recalculate these NAWQC to reflect the resident species observed in arid West receiving waters. This research report states that "*speciation and/or complexation of aluminum is highly dependent on ambient water quality characteristics and ultimately determines the mechanism of toxicity. [Increased] Concentrations of calcium in the water was shown to decrease toxic effects to fish.*" Based on the Arid West Technical Report, the Chronic Aluminum (total) Criterion Value is calculated as 1954 µg/L for a mean hardness value of 272 mg/L as $CaCO_3$, which is similar to the WER value calculated in Manteca's Phase II WER Study.

The City of Manteca completed an aluminum WER study (12 April 2007) for the San Joaquin River near its discharge point, which is located upstream of the Discharger's outfall. The Manteca WER study, which may be used to calculate a WER for the City of Manteca's discharge, indicated that a WER of 22.7 can be applied to the chronic criterion for aluminum. Since the characteristics of the river (e.g. hardness and pH) near Manteca are similar to those near the City of Stockton, the results of the Manteca WER study put into question the applicability of the stringent CCC recommended by the NAWQC for aluminum. Using the WER adjustment in accordance with the SIP, the applicable water quality criteria for aluminum for chronic exposure becomes 22.7 x 87 µg/L or 1975 µg/L.

Although the Arid West Technical Report has not been approved by USEPA nor has it received independent scientific peer review, based on its findings and the Manteca WER study, the Regional Water Board finds that there is uncertainty of the appropriateness of using the chronic criterion recommended in the NAWQC (87 µg/L). Therefore, for this RPA for aluminum, an acute and chronic criterion of 750 µg/L was used for protection of aquatic life and the secondary MCL of 200 µg/L was used for protection of MUN.

Based on 21 samples collected between 29 January 2002 and 2 August 2006, the MEC for aluminum was 2,900 µg/L. The maximum observed upstream receiving water aluminum concentration was 1,800 µg/L, based on 19 samples collected between 20 March 2002 and 2 August 2006. Therefore, aluminum in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a level necessary to protect aquatic life and the MUN beneficial use.

Based on the above information, using the chronic criterion recommended in the NAWQC (87 µg/L) is not appropriate for the receiving water. Therefore, this Order contains a final Average Monthly Effluent Limitation (AMEL) and Maximum

Daily Effluent Limitation (MDEL) for aluminum of 311 µg/L and 750 µg/L, respectively, based on USEPA's NAWQC of 750 ug/L for the protection of freshwater aquatic life (See Table F-7 of this Fact Sheet for WQBEL calculations). This Order also contains an annual average effluent limitation of 200 µg/L for aluminum, based on the Secondary MCL, for protection of the MUN beneficial use. In addition, this Order includes a reopener to consider a revision of the final effluent limitations for aluminum if additional information is provided by the Discharger, such as submission of a defensible water effects ratio study or defensible findings from an independent scientific peer review of the Arid West Technical Report, particularly the updated national ambient water quality criteria contained in Chapter 3 of that report.

Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for aluminum are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the aluminum effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

f. **Ammonia Nitrogen, Total (as N).** Untreated municipal wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The previous permit, Order No. R5-2002-0083, contained final effluent limitations for ammonia (as N), an AMEL of 2 mg/L (917 lbs/day) and an MDEL of 5 mg/L (2,294 lbs/day), and contained a provisional requirement to evaluate the effects that a nitrification facility would have and what additional treatment may be necessary. Because the Discharger could not immediately comply with the final effluent limitations, the Regional Water Board also issued Cease and Desist Order (CDO) No. R5-2002-0084 to provide a compliance schedule for construction and operation of the nitrification facilities. The CDO required full compliance with the ammonia limitations by 1 April 2007. The Discharger petitioned the State Water Board requesting review of these Orders. In response to the Discharger's petition, the State Water Board granted a stay for portions of the existing permit and the CDO (See previous section I.B of this Fact Sheet), and as a result, extended the compliance date with these ammonia effluent limitations to 10 August 2008. The Discharger has since added nitrification facilities, which include nitrifying biotowers and engineered wetlands; thus, the Discharger now nitrifies to remove ammonia from the waste stream to meet the ammonia limits in Order No. R5-2002-0083.

Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. Discharges of ammonia would violate the Basin Plan narrative toxicity objective. Therefore, the discharge has the reasonable potential to cause or contribute to an exceedance of the Basin Plan's narrative toxicity objective. Applying CFR Part 122.44(d)(1)(vi)(B), it is appropriate to use USEPA's Ambient National Water Quality Criteria for the Protection of Freshwater Aquatic Life for ammonia, which was developed to be protective of aquatic organisms.

USEPA's *Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life*, for total ammonia, recommends acute standards (1-hour average; criteria maximum concentration) based on pH, and chronic standards (30-day average, criteria continuous concentration) based on pH and temperature. It also recommends a maximum four-day average concentration of 2.5 times the criteria continuous concentration. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. The beneficial uses of the San Joaquin River downstream of the discharge include migration of aquatic organisms, and spawning, reproduction, and/or early development. Thus, because the presence of salmonids and early fish life stages in San Joaquin River within the vicinity of the discharge is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used. USEPA's recommended criteria are shown below:

$$CCC_{30-day} = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \times MIN\left(2.85, 1.45 \cdot 10^{0.028(25-T)}\right), \text{ and}$$

$$CMC = \left(\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}\right),$$

where T is in degrees Celsius

Previous Order No. R5-2002-0083 demonstrated that the effluent discharge has reasonable potential to exceed ammonia water quality criteria in the receiving water through four separate methods: (1) identifying toxicity in the RWCF effluent using "real-time" data (ammonia, pH, and temperature occurring simultaneously), (2) identifying toxicity in the receiving water using "real-time" data, (3) showing reasonable potential based on critical conditions that are a combination of worst-case observations, and (4) evaluation based on the expected receiving water pH and temperature occurring under drought flow conditions. The complex derivation of the final ammonia effluent limitations were based on these four methods and the Discharger's cost-effective analysis of upgrading the Facility. As a result, previous Order No. R5-2002-0083 required the same ammonia-N effluent limits as the 1994 permit, MDEL of 5 mg/L and an AMEL of 2 mg/L, which became effective August 2008. By letter dated 22 March 2002, EPA

Region IX concurred with the methodology for calculating the WQBELs for ammonia.

Since issuance of the previous Order No. R5-2002-0083, additional "real time" data for both the effluent and receiving water was obtained, and therefore, the effluent and receiving water monitoring data from September 1992 through December 2007 were evaluated to determine the accuracy of the evaluation of the acute and chronic ammonia criteria. An acute ammonia toxicity criterion was calculated for each receiving water pH value using the CMC equation based on salmonids present. A chronic toxicity criterion was calculated for each paired receiving water 30-day average temperature and pH using the CCC equation based on early life stages present. A total of 619 receiving water ammonia concentration samples (either R2 or R2a, whichever was greater) were compared to its paired acute and 30-day average chronic criteria for ammonia. Table F-4 below lists the occurrences where the receiving water ammonia concentration exceeded the ammonia criteria.

Table F-4. Summary of Ammonia Effluent Limit Derivations

Date	Year Hydrological Type	Ammonia Concentrations (mg/L as N)			Ammonia Criteria (mg/L as N)	
		Effluent Daily	Receiving Water Daily	Receiving Water Monthly Average	Acute	30-day Average Chronic
Jan-00	Above Normal	24.7	5.9	5.9	17.5	5.1
Jan-04	Dry	24.4	6.5	4.4	13	4.2
Feb-04	Dry	26	7.2	4.9	13.5	4.1
Feb-04	Dry	26	4.3	5.2	12	3.4
Feb-04	Dry	25.2	5.5	5.5	12.8	3.4

As indicated in Table F-4 above, at times the chronic criterion was exceeded in the receiving water. However, these exceedances occurred during periods of high effluent concentrations of ammonia, as much as five times the MDEL allowed in the previous Order. As previously discussed in this Fact Sheet, the Discharger upgraded the Facility in September 2006 to meet the final ammonia effluent limits. Further evaluation of 72 paired effluent and receiving water samples obtained after the Facility's upgrade (18 September 2006) yields a maximum daily effluent concentration value of 12.5 mg/L and an average value of 3.37 mg/L, and a receiving water maximum concentration of 0.9 mg/L and an average value of 0.35 mg/L. Based on this evaluation, the ammonia effluent limitations at a MDEL of 5 mg/L and an AMEL of 2 mg/L are fully protective of the beneficial uses, and therefore, this Order carries forward these limitations from the previous Order.

Research has demonstrated that ammonia can inhibit growth of marine diatoms at ammonia concentrations in the receiving water much lower than ammonia concentrations that impact fish species. Studies are in progress examining possible impacts of ammonia on growth of fresh water diatoms that exist in the

Delta in the vicinity of this discharge. The Delta has a relative low primary productivity for an estuarine environment. If ammonia inhibition of fresh water diatoms does occur, it is possible that lowered primary productivity from diatom inhibition could be a contributing factor to Delta pelagic organism decline. Studies are ongoing to evaluate the effect of ammonia on the inhibition of growth of freshwater diatoms in the Delta, as well as, studies to evaluate the sensitivity of delta smelt to ammonia toxicity. Based on the result of these or other studies, this Order may be reopened to reconsider the ammonia effluent limitations.

g. **Bis (2-ethylhexyl) phthalate.** Bis (2-ethylhexyl) phthalate is used primarily as one of several plasticizers in polyvinyl chloride (PVC) resins for fabricating flexible vinyl products. According to the Consumer Product Safety Commission, USEPA, and the Food and Drug Administration, these PVC resins are used to manufacture many products, including soft squeeze toys, balls, raincoats, adhesives, polymeric coatings, components of paper and paperboard, defoaming agents, animal glue, surface lubricants, and other products that must stay flexible and noninjurious for the lifetime of their use. The State MCL for bis (2-ethylhexyl) phthalate is 4 µg/L and the USEPA MCL is 6 µg/L. The NTR criterion for human health protection for consumption of water and aquatic organisms is 1.8 µg/L and for consumption of aquatic organisms only is 5.9 µg/L. The previous Order contained a daily maximum effluent limitation of 48 µg/L.

The MEC for bis (2-ethylhexyl) phthalate was 5.5 µg/L, based on 61 samples collected between 1 May 2001 and 14 June 2006, while the maximum observed upstream receiving water bis (2-ethylhexyl) phthalate concentration was 3.2 µg/L, based on 21 samples collected between 22 May 2002 and 15 November 2006. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the NTR criterion for bis (2-ethylhexyl) phthalate.

Section 1.4.3.2 of the SIP states that the ambient background concentration shall be set equal to the arithmetic mean of the individual reported measure or estimated concentration. All ambient background samples were reported below the reported detection limits (non-detects) except for the sample obtained on 10 November 2004, and therefore, the arithmetic mean concentration is set at that concentration value of 3.2 µg/L. Per the SIP, no dilution is allowed since the arithmetic mean exceeds the bis (2-ethylhexyl) phthalate criterion. This Order includes an AMEL and MDEL for bis (2-ethylhexyl) phthalate of 1.8 µg/L and 3.6 µg/L, respectively, based on the NTR criterion for the protection of human health (see Table F-8 for WQBEL calculations).

Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for bis (2-ethylhexyl) phthalate are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore,

a compliance time schedule for compliance with the bis (2-ethylhexyl) phthalate effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

h. **Chlorodibromomethane (Dibromochloromethane).** A performance-based MDEL of 23 µg/L was applied in the previous Order and monitoring requirements were established to evaluate the reasonable potential of chlorodibromomethane to exceed water quality criteria. The CTR includes a chlorodibromomethane criterion of 0.41 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. The MEC for chlorodibromomethane was 29 µg/L, based on 60 samples collected between 20 March 2002 and 15 November 2006 while concentrations were not detected in 26 receiving water samples (non-detects) collected during this same period. The reported detection levels ranged from 0.5 µg/L to 0.03 µg/L; accordingly, the ambient background concentration was set at 0.03 µg/L (per SIP section 1.4.3.2). Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for chlorodibromomethane.

   A dilution credit for chlorodibromomethane of up to 13:1 can be granted, based on the available human health dilution (see Section IV.C.2.c). An AMEL and MDEL for chlorodibromomethane of 5.0 µg/L and 16 µg/L, respectively, are included in this Order based on the CTR criterion for the protection of human health (see Table F-9 for WQBEL calculations). These more stringent effluent limitations are necessary to be consistent with the SIP and the antidegradation requirements. The CTR criterion for fish consumption only is 34 µg/L, therefore, these effluent limits are protective of human health for the consumption of fish caught within the human health mixing zone.

   Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for chlorodibromomethane are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the chlorodibromomethane effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

i. **Chlorine Residual.** The Discharger uses chlorine for disinfection, which is extremely toxic to aquatic organisms. The Discharger uses a sulfur dioxide process to dechlorinate the effluent prior to discharge to the San Joaquin River. Due to the existing chlorine use and the potential for chlorine to be discharged, the discharge has a reasonable potential to cause or contribute to an in-stream

excursion above the Basin Plan's narrative toxicity objective.

The USEPA *Technical Support Document for Water Quality-Based Toxics Control* [EPA/505/2-90-001] contains statistical methods for converting chronic (4-day) and acute (1-hour) aquatic life criteria to average monthly and maximum daily effluent limitations based on the variability of the existing data and the expected frequency of monitoring. However, because chlorine is an acutely toxic constituent that can and will be monitored continuously, an average 1-hour limitation is considered more appropriate than a maximum daily limitation; and a 4-day limitation is considered more appropriate than an average monthly effluent limitation. Therefore, an average 1-hour effluent limitation of 0.02 mg/L and an average 4-day effluent limitation of 0.01 mg/L for chlorine are included in this Order based on the criteria. Based on data reported during the previous permit term, it appears as if the Discharger can immediately comply with these new effluent limitations for chlorine residual.

The chlorine residual limitations required in this Order are protective of aquatic organisms in the undiluted discharge. If compliance is maintained, the Regional Water Board does not anticipate residual chlorine impacts to benthic organisms.

j. **Chloride. (see Subsection aa, below, for Salinity)**

k. **Chloroform. (see Subsection gg, below, for Total Trihalomethanes)**

l. **Copper, Total Recoverable.** The CTR includes hardness-dependent criteria for the protection of freshwater aquatic life for copper. The criteria for copper are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The USEPA default conversion factors for copper in freshwater are 0.96 for both the acute and the chronic criteria. Using the reasonable worst-case ambient hardness, estimated here as the lowest effluent hardness (98 mg/L as $CaCO_3$), and the USEPA recommended dissolved-to-total translator, the applicable chronic criterion (maximum 4-day average concentration) is 9.17 µg/L and the applicable acute criterion (maximum 1-hour average concentration) is 13.74 µg/L, as total recoverable.

The MEC for total copper was 6.3 µg/L, based on 67 samples collected between 20 March 2002 and 10 January 2007, while the maximum observed upstream receiving water total copper concentration was 5 µg/L, based on 10 samples collected between 20 March 2002 and 4 December 2002. Therefore, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for copper.

Therefore, based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed water quality criteria for copper. The removal of the effluent limitations for copper is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

m. **Cyanide, Total Recoverable.** The CTR includes maximum 1-hour average and 4-day average cyanide concentrations of 22 µg/L and 5.2 µg/L, respectively, for the protection of freshwater aquatic life. The MEC for cyanide was 13 µg/L, based on 120 samples collected between 20 January 2002 and 30 June 2008, while the maximum observed upstream receiving water cyanide concentration was 300 µg/L, based on 10 samples collected between 20 March 2002 and 4 December 2002. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for cyanide. Previous Order No. R5-2002-0083 contains final limits for cyanide that became effective 1 May 2006, an AMEL of 4.0 µg/L and a MDEL of 9.2 µg/L. However, based on the procedures in the SIP, and on recent effluent data, this Order contains cyanide effluent limitations recalculated as an MDEL at 9.0 µg/L and an AMEL at 4.1 µg/L (see Table F-11 for WQBEL calculations).

To comply with the requirements of the previous Order No. R5-2002-0083, the Discharger developed a pollution prevention plan for cyanide, which included a source identification study and mass balance of influent loadings. Based on the findings of this study, the Discharger concluded that 71% of the cyanide influent load is from residential sources, 12% is from commercial sources, and 7% is from the industrial dischargers. As such, implementation of local limits or other industrial source control may not have a significant impact in overall cyanide reduction.

To determine if the cyanide exceedences are actually a function of sample preservation techniques ("Cyanide Formation and Fate in Complex Effluents and its Relation to Water Quality," Water and Environmental Research Foundation, 2003), the Discharger is currently investigating the feasibility of modifying its analytical procedures. In addition to modifying analytical procedures, which in the City's case would require construction of new laboratory facilities, the City will also evaluate operational modifications that can be made to their filtration and disinfection facilities to reduce cyanide formation. The City will also evaluate the benefits and feasibility of switching its current chlorine-based disinfection system to alternative disinfection, and if necessary, construct alternative disinfection facilities. The previous Order No. R5-2002-0083 cyanide effluent limitation has been modified in this Order, and based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. Because new or modified control measures may be necessary as proposed in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days, a compliance time schedule for compliance with the cyanide effluent limitations is established in TSO No. R5-2008-0155 in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

n. **Diazinon.** The Basin Plan requires the Regional Water Board to consider relevant numerical criteria and guidelines developed by other agencies in determining compliance with the narrative toxicity objective (Basin Plan, IV-17.00). In March 2000, the California Department of Fish and Game (DFG)

established acute and chronic criteria for diazinon to protect fresh water aquatic life. The acute (1-hour average) and chronic (4-day average) criteria are 0.08 µg/L and 0.05 µg/L, respectively. Order No. R5-2002-0083 established a MDEL of 0.1 µg/L.

The MEC for diazinon was <0.25 µg/L, based on 57 samples collected between 22 May 2002 and 10 January 2007, and no diazinon concentrations was detected in the upstream receiving water monitoring results, <0.25 µg/L, based on three samples collected between 22 May 2002 and 13 November 2002. Based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed water quality criteria for diazinon. The removal of the effluent limitations for diazinon is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

o. **Dichlorobromomethane (Bromodichloromethane).** A performance-based MDEL of 82 µg/L was applied in the previous Order and monitoring requirements were established to evaluate the reasonable potential of dichlorobromomethane to exceed water quality criteria. The CTR includes a dichlorobromomethane criterion of 0.56 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. The MEC for dichlorobromomethane was 36 µg/L, based on 82 samples collected between 20 March 2002 and 13 May 2008; while dichlorobromomethane concentrations were not detected in the upstream receiving water monitoring samples. Therefore, the discharge demonstrates a reasonable potential to cause or contribute to an in-stream excursion above the CTR criterion for dichlorobromomethane.

A dilution credit for dichlorobromomethane of up to 13:1 can be granted, based on the available human health dilution (see Section IV.C.2.c). An AMEL and MDEL for dichlorobromomethane of 6.8 µg/L and 20 µg/L, respectively, are included in this Order based on the CTR criterion for the protection of human health (See Table F-10 for WQBEL calculations). These more stringent effluent limitations are necessary to be consistent with the SIP and antidegradation requirements. The CTR criterion for fish consumption only is 46 µg/L, therefore, these effluent limits are protective of human health for the consumption of fish caught within the human health mixing zone.

Based on the sample results in the effluent, it appears that the Discharger may be in immediate non-compliance upon issuance of the permit. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for dichlorobromomethane are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the dichlorobromomethane effluent limitations is established in TSO No. R5-2008-0155 in accordance with

CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.

p. **1,1-Dichloroethylene (1,1-DCE).** The CTR includes a 1,1-dichloroethylene criterion of 0.057 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Based on performance data collected between April 1994 and April 2000, the previous order established an interim MDEL of 14.5 µg/L.

1,1-dichloroethylene was not detected in the effluent and the maximum detection level was <0.06 µg/L, based on 68 samples collected between 20 March 2002 and 10 January 2007. Also, 1,1-dichloroethylene was not observed in the upstream receiving water concentration and the maximum detection level was <0.06 µg/L, based on 26 samples collected between 20 March 2002 and 15 November 2006. Based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed water quality criteria for 1,1-dichloroethylene. The removal of the effluent limitations for 1,1-dichloroethylene is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

q. **Dichloromethane (Methylene Chloride).** The CTR includes a criterion of 4.7 µg/L for dichloromethane for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Previous Order No. R5-2002-0083 established an MDEL of 25 µg/L, and an AMEL of 14.5 µg/L.

Dichloromethane was not detected in the effluent and the maximum detection level was <0.5 µg/L, based on 68 samples collected between 20 March 2002 and 10 January 2007. The maximum observed upstream receiving water dichloromethane concentration was 0.12 µg/L, based on 10 samples collected between 20 March 2002 and 4 December 2002. Based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed the CTR criterion for dichloromethane. Therefore, effluent limitations are not necessary. The removal of the effluent limitations for dichloromethane is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

r. **Dissolved Oxygen.** Board Resolution No. R5-2005-0005 was adopted on 27 January 2005 by the Regional Water Board, and approved by the USEPA on 7 February 2007. Board Resolution No. R5-2005-0005 establishes a TMDL for factors contributing to the dissolved oxygen impairment in the Stockton Deep Water Ship Channel portion of the San Joaquin River. The TMDL is applicable to the Facility's discharge, but does not apply direct minimum limitations on DO concentrations in the effluent. However, the Basin Plan identifies objectives for dissolved oxygen in the SJR, between Turner Cut and Stockton. The previous permit, Order No. R5-2002-0083, contained effluent limitations for dissolved oxygen of 6.0 mg/L from 1 September through 30 November and 5.0 mg/L throughout the remainder of the year.

The minimum DO concentration observed was 1.8 mg/L based on 1,498 samples collected between 1 May 2002 through 31 January 2007. The discharge demonstrates reasonable potential to exceed water quality objectives contained in the Basin Plan. Therefore, the daily minimum effluent limitations for dissolved oxygen contained in the previous permit, Order No. R5-2002-0083, are retained in this Order, and are based on the Basin Plan water quality objectives for dissolved oxygen concentrations in the San Joaquin River.

s. **Electrical Conductivity. (see Subsection bb., below, for Salinity)**

t. **Manganese, Total Recoverable.** The applicable water quality objective for manganese contained in Table III-1 of the Basin Plan is 50 µg/L (as dissolved). In the absence of a specific translator for manganese, a translator of 1 is assumed (i.e., the applicable objective for manganese in the total form is equal to 50 µg/L). The MEC for manganese was 180 µg/L (reported as total), based on 23 samples collected between 29 January 2002 and 14 November 2006. The maximum observed upstream receiving water manganese concentration was 240 µg/L (as total), based on 10 samples collected between 20 March 2002 and 4 December 2002.

To determine the assimilative capacity of the San Joaquin River for manganese, the Discharger conducted additional upstream receiving water monitoring during the period 7 December 2005 through 2 August 2006, and measured manganese as total and dissolved. The results of this study were provided as part of their report of waste discharge, and the arithmetic mean of the observed upstream receiving water concentration for dissolved manganese was reported as 7 µg/L. The dissolved data for the receiving water indicates assimilative capacity exists in the receiving water for manganese. Therefore, a dilution credit for manganese of up to 13:1 can be granted, based on the available human health dilution (as discussed in Section IV.C.2.c above). In accordance with 40 CFR 122.45(c), the WQBEL in dissolved form was converted to the total form using the assumed translator of one. Based on the allowable dilution credit, an MDEL of 1308 µg/L is calculated. However, the Regional Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilative capacity for manganese and could violate the Antidegradation Policy. For this reason, a performance-based effluent limitation (mean plus 3.3 standard deviations) is included in this Order., An MDEL for total manganese of 286 µg/L is included in this Order based on Basin Plan objectives for the protection of human health. Based on the sample results for the effluent, it appears the Discharger can meet this new limitation.

u. **Mercury, Total.** The current USEPA Ambient Water Quality Criteria for Protection of Freshwater Aquatic Life, continuous concentration, for mercury is 0.77 µg/L (30-day average, chronic criteria). The CTR contains a human health criterion (based on a one-in-a-million cancer risk) of 0.050 µg/L for waters from which both water and aquatic organisms are consumed. Both values are controversial and subject to change. In 40 CFR Part 131, USEPA acknowledges that the human health criteria may not be protective of some aquatic or

endangered species and that "*...more stringent mercury limits may be determined and implemented through use of the State's narrative criterion.*" In the CTR, USEPA reserved the mercury criteria for freshwater and aquatic life and may adopt new criteria at a later date.

From 20 March 2002 through 10 January 2007, the Discharger collected 67 effluent samples for total mercury. The maximum observed effluent mercury concentration was 0.013 µg/L (March 2002). The Stockton Deep Water Ship Channel portion of the Delta Waterways, which is about 1.5 miles downstream of the discharge, has been listed as an impaired water body pursuant to Section 303(d) of the Clean Water Act because of mercury. Mercury bioaccumulates in fish tissue, and therefore, the discharge of mercury to the receiving water is likely to contribute to exceedances of the narrative toxicity objective and impacts on beneficial uses. Because the Stockton Deep Water Ship Channel has been listed as an impaired water body for mercury, the discharge must not cause or contribute to increased mercury levels.

The SIP, Section 1.3, requires the establishment of an effluent limitation for a constituent when the receiving stream background water quality exceeds an applicable criterion or objective. Order No. R5-2002-0083 established a mass-based effluent limitation of 0.92 lbs/year for mercury based on the average flow rate for the period (33.2 mgd) and average discharge concentration for the period (0.0094 µg/L). In addition, the Discharger was required to perform an offset program feasibility and development study with the intention of mitigating the mass loading of mercury in effluent above the interim mass limitation. The Facility submitted the study in September 2006. The study identifies potentially feasible and unlikely feasible offset projects. The feasibility is primarily associated with legal liability concerns, regulatory constraints, applicable policies, and unwilling landowners. The report concludes that due to the uncertainty as to the viability of any offset projects, any future TMDL requirements, and future offset policies, it would be premature to propose permit conditions based on the current report. Therefore, the interim mass-based effluent limitation of 0.92 lbs/year is retained in this Order. This limitation is based on maintaining the mercury loading at the current level until a TMDL can be established and USEPA develops mercury standards that are protective of human health. Compliance time schedules have not been included since the discharge currently meets the water quality criteria and the mass limitation. If USEPA develops new water quality standards for mercury, the Regional Water Board adopts a Delta methylmercury TMDL or if the Regional Water Board determines that a mercury offset program is feasible for dischargers subject to a NPDES permit, this Order may be reopened to reevaluate the interim mercury mass loading limitation(s) and the need for a mercury offset program. The previous Order No. R5-2002-0083 established a mercury banking program to allow the Discharger to comply with the terms of that Order, to allow for growth, and to do so in a way that effectively removes the mercury from the watershed. The mercury banking program accumulated the difference between the interim mass limit (0.92 lbs/year) and the mercury mass discharges below that limit, and allowed the accumulative total (banked mercury loadings) to be used to offset mercury loads

above the interim mass limit. At the time the interim mass limit was established, there was relatively little mercury monitoring data to evaluate whether the Discharger could comply with the mass limit over the long term. Based on 67 analytical monitoring results for total mercury collected by the Discharger from 22 May 2002 through 10 January 2007, the annual mass discharge of total mercury was significantly below the 0.92 lbs/year interim limit, and thus, demonstrate that the Discharger can easily meet the mercury interim limit. Therefore, the mercury banking provisions are not necessary.

v. **Molybdenum, Total Recoverable.** Molybdenum is a naturally occurring trace element, and one of 15 elements known to be essential to plant growth. While essential in trace concentrations, excess concentrations are known to bioaccumulate in certain plant species, causing molybdenosis in ruminants (especially cattle) grazing on forage containing concentrations above 10 parts per million (ppm). Studies indicate the impact of molybdenum contamination of forage depends on the quality and amount of irrigation water applied to the field, as well as on the type and leachability of the soil. *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985), recommends that the molybdenum concentration in waters used for agricultural irrigation not exceed 10 µg/L. Applying the Basin Plan "Policy for Application of Water Quality Objectives", the numeric standard that implements the narrative objective is the Agricultural Water Quality Goal of 10 µg/L.

The MEC for molybdenum was 13 µg/L, based on 68 samples collected between 19 November 2002 and 10 January 2007. Therefore, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's chemical constituents objective. During the period from January 2006 through July 2006, the maximum background concentration of molybdenum was reported as 2.2 µg/L (2 July 2006), and the mean concentration was reported as 1.3 µg/L considering 8 sampling events. Results of the monitoring for molybdenum in the receiving water upstream of the Facility outfall indicate the San Joaquin River has assimilative capacity for molybdenum.

As discussed in Section IV.C.2.c. above, the effluent limitation calculation procedures in Section 1.4 of the SIP allow for the granting of a dilution credit for molybdenum based on the harmonic mean flow of the San Joaquin River and the arithmetic mean flow of the effluent. Based on the allowable dilution credit of up to 13:1, an AMEL and MDEL of 114 µg/L and 198 µg/L, is calculated respectively. However, the Regional Water Board finds that granting of this dilution credit could allocate an unnecessarily large portion of the receiving water's assimilative capacity for molybdenum and could violate the Antidegradation Policy. Using a statistical method (mean plus 3.3 standard deviations), the MDEL is calculated at 11 µg/L; but because it is below the MEC of 13 µg/L, the MDEL for molybdenum established in this Order is 13 µg/L, which is the MEC.

w. **Nitrate plus Nitrite (as N).** Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. Nitrate and nitrite are known to cause adverse health effects in humans. The California DPH has adopted a Primary MCL at Title 22 of the CCR, Table 64431-A, for the protection of human health for nitrate plus nitrite (sum as nitrogen) of 10,000 µg/L.

USEPA has developed a primary MCL and a MCL goal of 1,000 µg/L for nitrite (as nitrogen). For nitrate, USEPA has developed a Drinking Water Standards Primary MCL and an Ambient Water Quality Criteria for protection of human health non-cancerous effects of 10,000 µg/L. Furthermore, recent toxicity studies have indicated a possibility that nitrate is toxic to aquatic organisms.

Inadequate or incomplete denitrification may result in the discharge of nitrate and/or nitrite to the receiving stream. The conversion of ammonia to nitrites and the conversion of nitrites to nitrates present a reasonable potential for the discharge to cause or contribute to an in-stream excursion above the Primary MCLs for nitrate plus nitrite.

Previous Order No. R5-2002-0083 required the Discharger to evaluate existing and future levels of nitrate in the discharge to determine if it would cause or contribute to an in-stream excursion above a narrative or numeric water quality standard. The Discharger submitted the final report, *Nitrate Analysis for the Stockton Regional Wastewater Control Facility*, dated December 2004. The Discharger states in this report that as the Facility's nitrification system is completed and ammonia concentrations are nitrified, the resulting "*effluent nitrate will likely exceed the MCL value of 10 mg/L during most of the year*". . . but "*will be less than 10 mg/L during the summer months, when the pond removal of both ammonia and nitrate is greatest.* " The Discharger added nitrification facilities, which include biological trickling filter towers with plastic filter medium and engineered wetlands. Both nitrification facilities were on-line by 18 September 2006.

Subsequent samples (72 total) obtained by the Discharger from 18 September 2006 through 31 January 2008, resulted in MECs for nitrate and nitrite of 29 mg/L (29 January 2007) and 4.0 mg/L (14 March 2007), respectively, and a total of 384 samples obtained during this same period resulted in a MEC for ammonia of 17 mg/L (6 January 2007). Based on this data, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the nitrate plus nitrite criterion.

The maximum observed upstream receiving water nitrate and nitrite concentration was 4.2 mg/L and 0.1 mg/L respectively, based on 162 samples collected between 20 March 2002 and 9 January 2006. These results indicate that the receiving water has assimilative capacity for nitrate plus nitrite. Based on the dilution credit applicable to the human health criteria and the fact that

modeling and field observations have shown that complete mixing is assured prior to the nearest possible drinking water intake, a dilution credit of up to 13:1 may be allowed (see Section IV.C.2.c of this Fact Sheet) in calculation of the WQBELs for nitrate plus nitrite, resulting in an AMEL for nitrate plus nitrite of 113 mg/L. However, allocating the full assimilative capacity for nitrate plus nitrite is not consistent with the Antidegradation Policy (Resolution 68-16), and based on Facility performance, the Discharger can meet a more stringent performance-based effluent limitation. For this reason, a statistically calculated (mean plus 3.3 standard deviations) performance-based effluent limitation is included in this Order. Therefore, based on a mean of 14.8 µg/L and the standard deviation of 7.45 µg/L, an MDEL for nitrate plus nitrite (as N) of 40 mg/L is included in this Order. This effluent limitation is based on the MCL and is necessary to assure the treatment process adequately nitrifies and denitrifies the waste stream to protect the potential beneficial use of municipal and domestic supply.

x. **Oil and Grease.** Untreated domestic wastewater contains oil and grease. The Basin Plan includes a water quality objective for oil and grease in surface waters, which states: "*Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses*". The previous Order included numeric monthly average and daily maximum effluent limitations of 10 mg/L and 15 mg/L, respectively, to implement the Basin Plan's narrative objective for oil and grease. The antidegradation provisions of the State Water Resources Control Board Resolution No. 68-16 state that: " *Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.*" Based on effluent monitoring data obtained from 1 January 2003 through 31 January 2008, a MEC of 14 mg/L and a highest monthly average of 9.5 mg/L have been reported by the Discharger. Therefore, the discharge does not demonstrate a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative objective for oil and grease and floating material. This Order removes the effluent limitations for oil and grease based on new information consistent with anti-backsliding requirements of 40 CFR 122.44(l)(2)(i)(B)(*1*). The Regional Water Board finds removing the effluent limitations for oil and grease is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution 68-16. Any impact on existing water quality will be insignificant

y. **Pathogens**. The beneficial uses of the San Joaquin River include, in part, municipal and domestic supply, water contact recreation, and agricultural irrigation supply, and there is, at times, less than 20:1 dilution. To protect these beneficial uses, the Regional Water Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The principal infectious agents (pathogens) that may be present in raw sewage may be classified into

three broad groups: bacteria, parasites, and viruses. Tertiary treatment, consisting of chemical coagulation, sedimentation, and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream. The wastewater must be treated to tertiary standards (filtered), or equivalent, to protect contact recreational and food crop irrigation uses.

The California Department of Public Heath (DPH) (formally the Department of Health Services) has developed reclamation criteria, CCR, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Provision G.1 of the previous Order No. R5-2002-0083 required the Discharger to treat wastewater to Title 22 treatment requirements (or equivalent) by 1 May 2006, which was extended to 25 September 2007 by State Water Board Stay Order and the Court Order. The Discharger has complied with Provision G.1 and currently treats effluent to Title 22 treatment requirements. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 mL as a 7-day median. As coliform organisms are living and mobile, it is impracticable to quantify an exact number of coliform organisms and to establish weekly average limitations. Instead, coliform organisms are measured as a most probable number and regulated based on a 7-day median limitation.

Title 22 also requires that recycled water used as a source of water supply for non-restricted recreational impoundments be disinfected tertiary recycled water that has been subjected to conventional treatment. A non-restricted recreational impoundment is defined as "*...an impoundment of recycled water, in which no limitations are imposed on body-contact water recreational activities.*" Title 22 is not directly applicable to surface waters; however, the Regional Water Board finds that it is appropriate to apply an equivalent level of treatment to that required by DPH's reclamation criteria because the receiving water may be used for irrigation of agricultural land and/or for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for the irrigation of food crops and/or for body-contact water recreation. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DPH.

In addition to coliform testing, turbidity specifications have been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The previous Order No. R5-2002-0083 established effluent limitations for turbidity, including a weekly average of 2 nephelometric turbidity units (NTU), and a daily maximum of 10 NTU. The previous Order No. R5-2002-0083 also prohibited the effluent from exceeding 5 NTU more than 5 percent of the time, and prohibited the effluent from exceeding 10 NTU at any given time if the effluent was continuously monitored. Failure of the filtration system such that virus removal is impaired

would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations. The limitations in the previous Order No. R5-2002-0083 were solely an operational check to ensure the treatment system was functioning properly and could meet the limits for total coliform organisms. The effluent limitations were not intended to regulate turbidity in the receiving water. Rather, turbidity should be an operational parameter to determine proper system function and not a WQBEL. Therefore, to ensure compliance with the DPH recommended Title 22 disinfection criteria, this Order contains operational turbidity specifications to be met prior to disinfection in lieu of effluent limitations (See Special Provisions VI.C.5.f. Turbidity Operational Requirements in the Limitations and Discharge Requirements section of this Order).

To be consistent with current DPH guidance the operational requirements for turbidity have been established as 2 NTU as a daily average, an instantaneous maximum of 10 NTU, and shall not exceed 5 NTU more than 5 percent of the time. This Order contains effluent limitations and requires a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. The Regional Water Board has previously considered the factors in CWC section 13241.

z. **Pesticides.** For DDT, Endrin Aldehyde, and Lindane, the CTR includes a criterion of 0.00059 µg/L, 0.76 µg/L, and 0.019 µg/L, respectively, for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Based upon available dilution, previous Order No. R5-2002-0083 established maximum yearly total of non-detects (ND) for DDT, Endrin Aldehyde, and Lindane based on the minimum acceptable reporting levels of <0.01 µg/L, <0.01 µg/L, and <0.02 µg/L, respectively.

   These pesticides were not detected (<0.002 µg/L) in 66 effluent monitoring samples collected between 20 March 2002 and 26 December 2006. Concentrations of these pesticides were not observed (<0.002 µg/L) in 25 upstream receiving water samples collected between 20 March 2002 and 15 November 2006. Based on new information and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to exceed water quality criteria for DDT, Endrin Aldehyde, and Lindane. The removal of the effluent limitations for these pesticides is in compliance with 40 CFR 122.44(l)(2)(i)(B)(1).

aa. **pH.** The Basin Plan includes a water quality objective for surface waters (except for Goose Lake) that the "*...pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses.*" Effluent Limitations for pH are included in this Order based on the Basin Plan objectives for pH.

bb. **Salinity.** The discharge contains total dissolved solids (TDS), chloride, sulfate, and electrical conductivity (EC). These are water quality parameters that are indicative of the salinity of the water. Their presence in water can be growth limiting to certain agricultural crops and can affect the taste of water for human consumption. There are no USEPA water quality criteria for the protection of aquatic organisms for these constituents. The Basin Plan contains a chemical constituent objective that incorporates State MCLs, contains a narrative objective, and contains numeric water quality objectives for EC, TDS, sulfate, and chloride. Table F-5 below summarizes salinity water quality objectives/criteria and effluent concentration values.

Table F-5. Salinity Water Quality Criteria/Objectives

Parameter	Agricultural WQ Goal[1]	Bay-Delta Plan	Secondary MCL[2]	Effluent	
				Avg	Max
EC (µmhos/cm)	Varies[3]	700 (1 Apr-31 Jul) 1000 (1 Aug – 31 Mar)	900, 1600, 2200	1205	1518
TDS (mg/L)	Varies	N/A	500, 1000, 1500	668	730
Sulfate (mg/L)	Varies	N/A	250, 500, 600	120	180
Chloride (mg/L)	Varies	N/A	250, 500, 600	178	210

1 Agricultural water quality goals based on *Water Quality for Agriculture*, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985)

2 The secondary MCLs are stated as a recommended level, upper level, and a short-term maximum level.

3 The EC level in irrigation water that harms crop production depends on the crop type, soil type, irrigation methods, rainfall, and other factors. An EC level of 700 umhos/cm is generally considered to present no risk of salinity impacts to crops. However, many crops are grown successfully with higher salinities.

The State Water Board's Bay-Delta Plan establishes water quality objectives at various "compliance points" in the estuary to protect beneficial uses. The Bay-Delta Plan at page 10 states: "The water quality objectives in this plan apply to waters of the San Francisco Bay system and the legal Sacramento-San Joaquin Delta, as specified in the objectives. Unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Delta, are applicable for all locations in that general area and compliance locations will be used to determine compliance with the cited objectives." What constitutes "in that general area" is not defined in the Plan.

The two nearest Bay Delta Plan compliance points are the San Joaquin River at Brandt Road Bridge, south of the discharge point along the San Joaquin River, and the San Joaquin River at Prisoner's Point, toward San Francisco Bay from the discharge point. Stockton's discharge is located between these two compliance points. The San Joaquin River at Brandt Bridge and at the discharge point is largely unchanged. The River flows in a relatively shallow, winding channel, and there are not major diversions or tributaries to the River between Brandt Bridge and Stockton. The Brandt Bridge compliance point is established to protect agricultural irrigation uses, and seasonally varies from 700 to 1000 µmhos/cm. The primary use of River Water at both locations is agricultural

irrigation. In contrast, the Prisoner's Point compliance point is located along the Stockton Deep Water Ship Channel where the San Joaquin River has been deepened and straightened. At Prisoner's Point there is seasonally a significant flow of Sacramento River water moving cross-Delta to the pumps near Tracy. The Prisoner's Point compliance point requires the April – May salinity to be maintained at 440 µmhos/cm or less, and is set to protect fish and wildlife beneficial uses. The water quality objectives prescribed for Brandt Road Bridge are judged to be applicable at the site of the Stockton discharge, as being in the "general area" of the compliance point and as having similar River and beneficial use conditions that would make the Brandt Road objective appropriate for beneficial use protection at the discharge point.

i. **Chloride**. The secondary MCL for chloride is 250 mg/L, as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum. The recommended agricultural water quality goal for chloride, that would apply the narrative chemical constituent objective, is 106 mg/L as a long-term average based on Water Quality for Agriculture, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D. W. Westcot, Rome, 1985). The 106 mg/L water quality goal is intended to protect against adverse effects on sensitive crops when irrigated via sprinklers.

   Chloride concentrations in the effluent ranged from 130 mg/L to 210 mg/L, with an average of 177.5 mg/L, for 12 samples collected by the Discharger from 29 January 2002 through 4 December 2002. Background concentrations in the San Joaquin River ranged from 38 mg/L to 140 mg/L, with an average of 108 mg/L, for 11 samples collected by the Discharger from 20 March 2002 through 4 December 2002. Both the receiving water and the effluent concentrations exceed the agricultural water quality goal of 106 mg/L.

ii. **Electrical Conductivity (EC)**. The secondary MCL for EC is 900 µmhos/cm as a recommended level, 1600 µmhos/cm as an upper level, and 2200 µmhos/cm as a short-term maximum. The agricultural water quality goal, that would apply the narrative chemical constituents objective, is 700 µmhos/cm as a long-term average based on Water Quality for Agriculture, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). The Bay-Delta Plan's seasonal salinity objectives for the San Joaquin River at Brandt Bridge are 700 µmhos/cm from April through August, and 1000 µmhos/cm from September through March. These objectives are applicable throughout the general geographic area, and, therefore, apply to the Facility's discharge.

   A review of the Discharger's monitoring reports for the last six years (2002 through 2007) shows an average effluent EC of 1205 µmhos/cm, with a range from 946 µmhos/cm to 1518 µmhos/cm for 290 samples. These levels exceed the applicable objectives. The background receiving water EC averaged 602.8 µmhos/cm in 192 sampling events collected by the

Discharger from 20 March 2002 through 9 January 2007, with a maximum high of 1169 µmhos/cm. These data show that the receiving water frequently has no assimilative capacity for EC.

iii. **Sulfate**. The secondary MCL for sulfate is 250 mg/L as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum. Sulfate concentrations in the effluent ranged from 10 mg/L to 180 mg/L, with an average of 119.8 mg/L, for 12 samples collected by the Discharger from 29 January 2002 through 4 December 2002. Background concentrations in the San Joaquin River ranged from 37 mg/L to 130 mg/L, with an average of 86.7 mg/L, for 10 samples collected by the Discharger from 20 March 2002 through 4 December 2002. These concentrations do not exceed the secondary MCL recommended level of 250 mg/L.

iv. **Total Dissolved Solids (TDS)**. The secondary MCL for TDS is 500 mg/L as a recommended level, 1000 mg/L as an upper level, and 1500 mg/L as a short-term maximum. The recommended agricultural water quality goal for TDS, that would apply the narrative chemical constituent objective, is 450 mg/L as a long-term average based on Water Quality for Agriculture, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). Water Quality for Agriculture evaluates the impacts of salinity levels on crop tolerance and yield reduction, and establishes water quality goals that are protective of the agricultural uses. The 450 mg/L water quality goal is intended to prevent reduction in crop yield, i.e., a restriction on use of water, for salt-sensitive crops. Only the most salt sensitive crops require irrigation water of 450 mg/L or less to prevent loss of yield. Most other crops can tolerate higher TDS concentrations without harm; however, as the salinity of the irrigation water increases, more crops are potentially harmed by the TDS, or extra measures must be taken by the farmer to minimize or eliminate any harmful impacts.

The average TDS effluent concentration was 668 mg/L; concentrations ranged from 550 mg/L to 730 mg/L for 12 samples collected by the Discharger from 29 January 2002 through 4 December 2002. These concentrations exceed the applicable water quality objectives. The background receiving water TDS ranged from 260 mg/L to 590 mg/L, with an average of 434 mg/L in 10 sampling events performed by the Discharger from 20 March 2002 through 4 December 2002. These data indicate the receiving water frequently exceeds water quality objectives and lacks assimilative capacity for TDS.

As required by previous Order No. R2-2002-0083, the Discharger completed a Wastewater Treatment Feasibility Study (June 2004) and pollution prevention plan (February 2005) for TDS. In the June 2004 report, the Discharger states "it could be argued that the effluent discharge for Stockton's RWCF helps maintain water quality objectives of the Delta.", that "the Discharge will not impact this [Southern one-third of the Delta that is 303(d)

listed] impaired area", and that "further treatment for TDS is unnecessary." However, in both reports, the Discharger provided the following alternatives that could further reduce salinity in the discharge if required:

- Source control:
  1) Actively monitor TDS levels in its drinking water supply wells and reduce the groundwater supply and supplement with surface water if groundwater TDS levels exceed the secondary MCL water quality objective; and
  2) Develop an industrial outreach program to encourage industrial users to reduce TDS levels in the influent.
- Salinity removal processes: Add a pressure driven membrane system to the current treatment process train; however this alternative may pose additional issues with the disposal of the reject brine. Additionally, an estimated $295 million would be required to add these advanced treatment facilities, and annual operation and maintenance costs are estimated at an additional $21.6 million per year. (see section v. Salinity Effluent Limitations below for further discussion)
- Local ordinances: Develop local regulations to ban installation and use of new and existing water softeners and local industrial TDS limits to reduce concentrations in the influent.

v. **Salinity Effluent Limitations.** Effluent limitations based on the MCL, the agricultural water quality goal, or the Basin Plan would likely require construction and operation of a reverse osmosis treatment plant. The State Water Board, in Water Quality Order 2005-005 (for the City of Manteca), states, "*...the State Board takes official notice [pursuant to Title 23 of California Code of Regulations, Section 648.2] of the fact that operation of a large-scale reverse osmosis treatment plant would result in production of highly saline brine for which an acceptable method of disposal would have to be developed. Consequently, any decision that would require use of reverse osmosis to treat the City's municipal wastewater effluent on a large scale should involve thorough consideration of the expected environmental effects.*" The State Water Board states in that Order, "*Although the ultimate solution to southern Delta salinity problems have not yet been determined, previous actions establish that the State Board intended for permit limitations to play a limited role with respect to achieving compliance with the EC water quality objectives in the southern Delta.*" The State Water Board goes on to say, "*Construction and operation of reverse osmosis facilities to treat discharges...prior to implementation of other measures to reduce the salt load in the southern Delta, would not be a reasonable approach.*" In addition, the State Board expressed concerns about costs of reverse osmosis; the same considerations apply to this Facility.

The Regional Water Board, with cooperation of the State Water Board, has begun the process to develop a new policy for the regulation of salinity in the Central Valley. In a statement issued at the 16 March 2006, Regional Water Board meeting, Board Member Dr. Karl Longley recommended that the

Regional Water Board continue to exercise its authority to regulate discharges of salt to minimize salinity increases within the Central Valley. Dr. Longley stated, "*The process of developing new salinity control policies does not, therefore, mean that we should stop regulation salt discharges until a possible interim approaches to continue controlling and regulating salts in a reasonable manner, and encourage all stakeholder groups that may be affected by the Regional Board's policy to actively participate in policy development.*"

As previously described, effluent data for EC and TDS indicate that effluent concentrations continue to be at levels of concern that may affect beneficial uses of the San Joaquin River. Therefore, this Order includes an annual average performance-based effluent limitation of 1300 µmhos/cm for EC to protect the receiving water from further salinity degradation, based on the highest annual average effluent concentration (see Table F-6 below). However, should the Discharger fail to implement the provisional requirements specified in Provision VI.C.3.c of this Order, then this Order requires the Discharger to comply with the seasonal monthly average EC effluent limits of 700 µmhos/cm from April through August and 1000 µmhos/cm from September through March instead, which are based on the Bay-Delta Plan water quality objectives for this geographical location. The Bay-Delta objectives are under review, but when or if the salinity objectives will be changed is unknown. The Regional Water Board must implement water quality objectives as they exist at this time.

Compliance with these effluent limitations and the requirements of Provision VI.C.3.c will result in a salinity reduction in the effluent discharged to the receiving water; however, the discharge may cause or contribute to an exceedance of a water quality objective for salinity until adequate measures are implemented to meet those objectives.

Table F-6. Summary of Annual Electrical Conductivity Effluent Concentrations

Electrical Conductivity (µmhos/cm)				
Year	**Count**	**Min**	**Avg**	**Max**
2002	40	1144	1264	1420
2003	50	1072	1195	1370
2004	50	1073	1209	1455
2005	48	1004	1229	1355
2006	50	968	1180	1518
2007	52	909	1089	1254

cc. **Settleable Solids.** For inland surface waters, the Basin Plan states that "[w]ater shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses. The previous permit, Order No. R5-2002-0083, required a daily maximum effluent limitation of 0.5 ml/L and a monthly average effluent limit of 0.1 ml/L for settleable solids. Analytical monitoring results obtained since issuance of the previous permit

showed that settleable solids concentration values in 1487 samples monitored during the period from 1 May 2002 through 31 January 2007 did not exceed the effluent limitations. Therefore, the discharge does not demonstrate a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative objectives for settleable solids. Based on this new information, this Order does not include effluent limitations for settleable solids; however, this Order requires effluent monitoring and contains a receiving water limitation for Settleable Substances to prevent deposition of material that causes nuisance or adversely affects beneficial uses as described further in section V.A. of this Fact Sheet.

dd. **Temperature**. The Thermal Plan requires that "*The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.*" Therefore, to ensure compliance with the Thermal Plan, an effluent limitation for temperature is included in this Order.

The Thermal Plan also states "Additional limitations shall be imposed when necessary to assure protection of beneficial uses." In part, beneficial uses applicable to San Joaquin River are migration of aquatic organisms (MIGR) both warm and cold habitats, and warm habitat spawning, reproduction, and/or early development (SPWN).

Previous permits, Orders No. 94-324 and R5-2002-0083, required the Discharger to evaluate the effect of its thermal discharge to migrating fish both within the vicinity of the discharge and downstream (or upstream due to tidal influences), with particular attention being paid to those periods when San Joaquin River flow is lowest and/or San Joaquin River or effluent temperature are highest. In compliance, the Discharger submitted in November 1995 (*Temperature Plan,* Systech 1995) and again in May 2006 (*Potential Thermal Effects of Stockton Regional Wastewater Control Facility Discharge on Migrating Fish in the San Joaquin River,* Jones and Stokes 2006) temperature studies to the Regional Water Board, USEPA, NOAA Fisheries, US Fish and Wildlife Services, and California Department of Fish and Game. These studies, based on data collected between 1988 through 1994 (for November 1995 report) and 2001 through 2005 (for May 2006 report) evaluated potential added stresses from the thermal discharge on the San Joaquin River and the potentially consequential near-field or far-field effects on adult and juvenile Chinook salmon and other migrating fish (i.e. delta smelt, splittail, etc.). Based on these reports, the Regional Water Board finds that additional thermal requirements are not necessary to protect the beneficial uses of San Joaquin River; comments were not received from the other state or federal agencies. Therefore, this Order does not contain additional temperature limitations; however, this Order does retain the previous permit, Order No. R5-2002-0083, temperature effluent and receiving water limitations to comply with the Thermal Plan requirements.

ee. **Tetrachloroethylene (PCE).** The NTR includes a tetrachloroethylene criterion of 0.8 µg/L for the protection of human health, based on a one-in-a-million cancer risk for waters from which both water and aquatic organisms are consumed.